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translator to RWS Group Ltd, of Europa House, Marsham Way, Gerrards Cross, Buckinghamshire, England declare;

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2. That I am well acquainted with the French and English languages.

3. That the attached is, to the best of my knowledge and belief, a true translation into the English language of the accompanying copy of the specification filed with the application for a patent in France on March 27, 2001 under the number 01/04,129 and the official certificate attached hereto.

4. That I believe that all statements made herein of my own knowledge are true and that all statements made on information and belief are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application in the United States of America or any patent issuing thereon.

For and on behalf of RWS Group Ltd

The 27th day of February 2006

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Drawn up in Paris, **07 FEB. 2002**

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1 NAME AND ADDRESS OF THE APPLICANT OR THE REPRESENTATIVE TO WHOM THE CORRESPONDENCE IS TO BE ADDRESSED

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Your file references: *(optional)* VG2 2001025 FR

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2 NATURE OF THE APPLICATION	Tick one of the 4 following boxes
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3 TITLE OF THE INVENTION (200 characters or spaces maximum)

SHELF FOR SUPPORTING ARTICLES, PARTICULARLY IN REFRIGERATED INSTALLATIONS.

4 PRIORITY DECLARATION OR APPLICATION FOR THE BENEFIT OF THE FILING DATE OF A PRIOR FRENCH APPLICATION	
	Country or organisation Date / / No.
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5 APPLICANT		☐ If there are other applicants, tick the box and use the "continuation" form
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7 INVENTOR (S)		
The inventors are the applicants		☐ Yes ☒ No **In this case, provide a separate designation of the inventor(s)**
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10 SIGNATURE OF THE APPLICANT OR REPRESENTATIVE (name and capacity of the signatory)

Virginie GOLDENBERG
Power of Attorney No. 422-5/S.006
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1st Filing

Shelf for supporting articles, particularly in refrigerated installations

The present invention relates to a shelf for supporting articles and which is intended to be fixed or mounted, in a horizontal or approximately horizontal position, in the chassis of a unit. In particular, it relates to a shelf that can be used in refrigerated compartments (refrigerated cabinets, chillers, refrigerators, etc.) for supporting articles, particularly food.

In domestic refrigerators, it is known practice to use shelves in the form of solid plates made of plastic or glass, such plates being simple to clean, hygienic and able to support all kinds of foodstuffs. These plates are usually equipped with a plastic surround that makes it possible to avoid the risk of injury on the sharp edges of the plates and/or makes it possible to strengthen said plates. Precise and attractive production of this surround making it possible to guarantee a good seal between the surround and the plate consists in injecting the plastic around the periphery of the plate placed in a mold so that it sandwiches (or embraces) the plate, gripping it on its edge and on its top face and underside. This is the "encapsulation" method. The material may also be injected around shelf support elements allowing this shelf to be mounted in the refrigerator. Encapsulation does, however, require specific installations limited to each type of shelf produced, may be complicated, and expensive, it also being possible for the shelves obtained to have disadvantages (limited ability to adapt to various types of structure, etc.).

It is also known practice to form the plastic surround independently of the plate (attached surround) and then for the two to be secured together by bonding. This method has advantages in terms of simplicity, cost,

ease of adaptation, etc., but may pose problems in terms of the robustness or longevity of the assembly and/or of appearance and/or of sealing.

The object of the present invention is to provide shelves which are improved with respect to the existing shelves as previously described. This objective is achieved by virtue of the shelf according to the invention. This shelf comprises at least one panel intended to take the articles, and at least one attached plastic structure (or surround) mating with the edge of the panel and/or exerting lateral pressure on the edges of the panel (or in other words holding the panel by compression of its edges or exerting radial pressure on the panel). According to one particularly advantageous embodiment, this precise adaptation to the contours of the panel and this compression are obtained by shrinking the plastic (or the plastic structure) as explained later on.

The panel (or plate or sheet) of the shelf according to the invention is generally rectangular, rigid, has an approximately flat surface for supporting articles (top face, in the position of use) and is not very thick with respect to its area. It is generally formed as a single piece (monolithic) but may also be more complex (in the form, for example, of a laminated structure comprising several sheets of glass and/or of plastic and/or of other materials). It may be opaque or translucent but is preferably at least partially transparent, for esthetic and practical purposes; it may also be equipped with functional or decorative layer(s) or pattern(s) (for example in enamel or ink) on one or more of its faces.

The panel may for example be made of glass, polycarbonate and/or polymethyl methacrylate. As a

preference, it at least comprises or is in the form of a sheet of glass, a material which is advantageous in terms of hygiene, rigidity, longevity, etc. For safety reasons, this glass is generally toughened, particularly in the case of a monolithic panel. The panel is usually solid, but may also comprise one or more reliefs and/or recesses and/or holes (for example for air circulation) and/or may have undergone one or more surface treatments such as sandblasting, striations, etc.

The plastic structure (or plastic support or surround) allows the panel to be supported and coats its sharp edges for more comfortable and safe handling of the shelf. In general, it is in the form of a frame, this frame having a bearing surface (formed by one or more parts which are approximately horizontal in the position of use and delimit a region the dimensions of which correspond approximately to the dimensions of the underside of the panel) for supporting the panel (for example, a bearing surface in the form of a frame supporting the panel at its periphery) and walls surrounding the edge (or the thickness of the edges if each of the sides in considered separately) of the panel, one or more walls on one and/or other of the sides rising up above the plane of the panel and/or protruding underneath below the plane of the panel (considering the shelf in its position of use).

The edges or walls of the plastic structure may be straight (vertical in position of use) or of a more complex shape, in particular may have peripheral parts or extensions for functional or esthetic purposes. For example, the structure may have an extension forming a handle on its front edge (or along one side of the shelf intended to remain free) and/or may have an upstand, for example along its rear edge, acting in

particular as a stop to prevent products placed on the shelf from coming into contact with the wall of a refrigerated unit containing it and/or may have side walls or lateral extensions extended, as appropriate by projecting fins or lugs capable of sliding between rails or on supports formed in the lateral walls of a unit. Reinforcing elements, fasteners, etc. may also be attached or provided in the plastic structure, such as metal assembly elements as explained later on, or reinforcing ribs or attachment means, etc. It is also possible to provide at least one channel, for collecting liquids if need be, or along which liquids can flow.

The plastic structure may also be solid and support the panel over its entire underside, or may support the panel at points other than on its periphery. Furthermore, the walls may border just part of the edge (or edges), it being possible for example for a wall to have openings over part of the edge at least along one of the sides. The plastic structure generally borders the panel around its entire periphery.

In one embodiment, the plastic structure may have or may collaborate with lighting means (preferably low voltage). For example, a light may be situated in a housing provided in the plastic structure. One surface (for example the underside) of the panel may be treated or machined, for example sandblasted or grooved, to amplify this illumination effect by refracting the beam of light emitted by a light source. The electrical power supply for lighting the light may be associated with the opening of the door of the container in which the shelf is positioned or may be associated with the operation of a special push-button switch.

The plastic structure is, according to the definition

given above, an attached part, that is to say one not formed directly on the panel but formed separately (or preformed) before being assembled with the panel. This structure requires equipment which is not as expensive as in the case of shelves formed by encapsulation, is simpler and offers greater flexibility.

One important feature of the invention according to the above definition, is that the plastic structure mates with the edge of the panel (and/or exerts lateral pressure on its edge). This may be all of the edges as seen earlier on or perhaps part of the edges. Advantageously, the plastic structure mates with at least two opposing edge parts (for example part of each of the lateral sides, the two covered parts opposing each other) and preferably at least two sides facing each other along their entire length and, as a particular preference, mates with at least part of the edges along all the sides of the shelf (front, lateral, rear sides). Advantageously, the structure mates with the panel around its entire circumference. It also mates with the panel over at least part of its height (or thickness), or even over its entire height.

This precise adaptation to the contours of the panel is advantageously obtained by shrinking the plastic. Alternatively or in addition, it may be obtained by using a plastic structure formed of at least two plastics (two-material structure), one of which is more flexible and intended to be in contact with the panel (particularly in contact with the edge of the panel) and best mates to its shape, this more flexible material partly, and perhaps fully, covering the other more rigid material (which provides the structure with integrity).

As an alternative to or preferably at the same time as

the adaptation to the contours of the panel, the plastic structure also presses the edge of the panel (or exerts radial pressure on the panel). The plastic structure holds (or retains) the panel by compression of its edges, which gives the association better rigidity and longevity. This pressure may be obtained mechanically by force-fitting (that is to say exerted by forcing) but is preferably obtained by shrinking the plastic, as explained below. In the latter preferred embodiment, the force compressing the structure onto the edge of the glass is of the order of a few MPa, generally at least 5 Mpa, and does not exceed 15 MPa, for example is of the order of 8 to 10 MPa.

Precise adaptation to the contours of the panel and retention by radial compression are therefore preferably obtained by shrinking the plastic (the shelf according to the invention in this case being defined in that the panel is secured to the structure by shrinking the structure (or the plastic of said structure)).

Depending on the plastic or plastics used to form the plastic structure, this shrinkage may be performed by cooling and possibly by changing the state of the plastic (for example changing to the semicrystalline state with internal reorganization of the material) and occurs to a fair extent. The desired shrinkage is generally at least 0.25% (with respect to the width and/or the length) of the structure and advantageously at least 0.5% and does not exceed 1.2% of said width (and/or length) so as to avoid visible deformation of the walls and a deterioration or unattractive appearance of the assembly.

The advantages of this shrinkage and of the shelf defined previously are many: there is no need to

machine the sides of the panel and of the parts of the structure to allow better connection, the plastic structure compensates for the tolerances on the panel (that is to say corrects dimensional variations of the plates relative to the mechanical manufacture of said plates) and gives a better appearance and better seal at the panel/structure join; in addition, aside from an economic advantage over the shelves obtained by encapsulation, the shelf according to the invention is also more practical, since the useful area for supporting objects is greater, the plastic not covering part of the top face of the panel. The shelf is also simpler to manufacture and offers greater possibility of adaptation to existing structures. It also has particularly satisfactory rigidity and longevity.

The present invention also relates to a method for obtaining the shelf whereby the plastic structure is formed separately from the panel by molding, in the hot state, the panel being assembled with the plastic structure as it leaves the mold before the plastic has fully shrunk.

The structure may be molded for example by injecting a plastic, previously heated and melted, into a closed mold or an injection-molding machine, the plastic being, for example, and advantageously, polypropylene, possibly filled with talc to improve its mechanical robustness or acrylonitrile-butadiene-styrene (ABS), etc., the plastic being chosen according to the characteristics, particularly strength, desired for the structure, but also according to its ability to shrink as required in the invention. Once molded, the material cools and solidifies, first in the mold to give a semifinished product which can be removed from the mold without losing its overall shape, then out of the mold, the shrinkage phenomenon occurring especially after the

mold has been opened and all the more so after extraction from the mold (the dimensions reducing but the shape remaining more or less the same).

Advantageously, the panel is assembled with the plastic structure after the mold has been opened and preferably outside the mold, before shrinkage reaches 40% (and preferably 30%) of the total shrinkage. In practice, this assembly often occurs in the 10 minutes, and preferably in the 4 minutes, following the opening of the mold, it being possible for the plastic to continue to shrink thereafter for several hours, but to an increasingly limited extent.

As a preference, prior to assembly and generally after opening the mold (except in the case of two-shot injection molding deposition as mentioned later on), adhesive(s) is(are) also deposited over at least part of the structure that is to be in contact with the panel (part of the supporting surface and/or possibly on both parts of the structure which are to be in contact with the edge) so as to further improve the seal and adhesion between the structure and the panel. This is preferably an adhesive of the elastic (or viscoelastic or soft) type, for example of the polyurethane type, making it possible to compensate for the respective expansions of the panel and of the plastic which are due to temperature changes in transport or in use (there being a risk that a "hard" adhesive would break in shear or become detached during temperature changes). The shelf according to the invention may thus comprise, aside from the plastic structure and the panel, an adhesive, preferably deposited around the periphery of the structure (in the form for example of flexible bead which is squashed when the panel and the structure are associated).

As mentioned previously, the plastic structure may also be formed of at least two plastics (two-material structure), one of which is more flexible and covers the other which is more rigid and intended to be in contact with the panel so as to better mate with its shape, the flexible material being squashed when the panel and the structure are associated (in the cold state from the formed structure and the panel, or in the hot state as in the method described previously) for better contact and better sealing between the panel and the plastic structure. This two-material plastic structure may be produced by two-shot injection molding (injecting the different materials in one and the same mold, generally one after the other).

As an alternative to the adhesive and/or to the makeup of the plastic structure, or in addition, it is possible to use one or more self-adhesive or otherwise insulating beads or gaskets, which may or may not be in the form of foam (or of a hot melt adhesive blown with air bubbles); it is also possible to give the gasket or bead of adhesive deposited a special shape (for example conical) for better contact when the gasket or the adhesive is squashed mechanically between the panel and the plastic structure. The surface of the panel may have been treated beforehand (at least in part) for example by sandblasting, so as to improve its key for adhesive, and/or for the plastic structure, after the opening of the mold and prior to the application of adhesive may have undergone a surface treatment (on the parts intended to receive the adhesive) such as goffering (formation of striation) or the formation of roughness or a plasma treatment (by spraying an ionized gas or playing a flame over the plastic surface) to improve the area of contact between the plastic and the adhesive and/or to create other points of attachment, or may alternatively have been equipped with a groove

to accommodate the gasket or the adhesive.

Possibly, the shrinkage of the plastic or an additional heat treatment may cause the appearance of a small bulge which presses against the top face of the panel (in the position of use) and, as appropriate, on the gasket and/or the adhesive and/or the flexible material of the plastic structure so as to provide additional sealing. Possibly, and depending on the plastic used, the shelf may also be obtained simply after an additional heat treatment of the plastic structure (reheating) subsequent to the molding of said structure, the panel being assembled with the structure after this additional heat treatment, an adhesive and/or a surface treatment possibly being deposited or performed prior to assembly.

As an alternative or in addition to the shrinkage of the plastic structure, it is also possible to produce the plastic structure by a technique known as "air molding" (or injection of plastic assisted by gas), this technique making it possible to obtain a shelf which has good robustness and rigidity with less material than conventional molding. This technique consists in introducing a pressurized inert gas (for example nitrogen) into the molten plastic during molding after the partial filling of the mold cavity so as to create, within the molded part, regions of greater thickness and empty regions. Air molding makes it possible, for example, to create reinforcements (extra thicknesses, ribs, etc.) along the sides of the plastic structure and possibly lateral support arms in the very body of the plastic structure. This technique also allows more rapid cooling of the molded part and shorter production cycles, and makes it possible to obtain a particularly satisfactory surface finish.

The present invention also relates to elements for assembling (or mounting) the shelf in units, these assembly elements being fixed by clipping (or catching in particular being fixed mechanically by imbrication means such as recesses and/or protrusions, teeth, lugs) onto the plastic structure of the shelf (more precisely underneath as a general rule) and advantageously having at least three parts. These elements are initially (each) in the form of a leaf (or fin or platelet), generally made of metal, and bent (for example by stamping) so that it has an approximately L-shaped cross section with at least one leg of the L (or first part of the element) intended to be clipped, under the panel, against a vertical wall of the plastic structure protruding from the underside of the panel and at least one part (second part of the element) of the other leg of the L intended to be clipped under the supporting surface of the plastic structure. These elements also initially have, at one of their (longitudinal) ends, a hook for the cantilever mounting of the shelf in a unit. The third part is formed by the end of a leg; depending on the mounting method envisaged, this end is either bent so that it rims another part of the shelf, particularly the plastic structure (the three parts therefore in this case holding the shelf in three directions, providing better stability and better robustness for the assembly), or fashioned to form a runner intended to collaborate with additional cantilever-mounted catching means belonging to the unit (in the case of sliding shelves), these additional means (for example in the form of a metal frame collaborating with the assembly elements) in this case being caught by hooks onto the unit, it then being possible for the hooks of the assembly elements to be removed by cutting them off. The adaptation of the third part of the assembly elements and the possible cutting-off of the hook may advantageously be done at

the last moment depending on the type of attachment required. It is thus possible to use the same shelf for all types of attachment (for example without the assembly elements for a shelf held on the side walls of the unit, or with the assembly elements for a cantilever attachment, whether this be in fixed or sliding mode). Note that the assembly elements described previously are also advantageous for any type of shelf other than the one of the invention.

The assembly elements previously described may, as the case may be, be considered independently of the shelf or as forming part of it and may be fixed definitively or detachably to the shelf. They guarantee not only the securing of the shelf to the wall but may also contribute to reinforcing the shelf. In general, at least two assembly elements are needed for mounting the shelf in a unit when the shelf is to be mounted cantilever fashion, these elements generally being fixed to the lateral sides of the shelves. As indicated previously, these elements may also slide on a frame fixed to the unit, this frame or runner advantageously being formed as a single piece (for example by stamping) for better strength and generally being made of metal. In this case and advantageously, sliding is between the assembly elements acting as intermediate elements and the additional support frame, and not directly between a support frame and the plastic structure.

As indicated previously, when the shelf is intended to be fixed cantilever fashion to the rear wall of the unit, the shelf has at least two parts projecting from its rear side (originating from the assembly elements when the shelf is intended to be mounted fixedly or from the additional frame when the shelf is intended to be mounted so that it can slide), which act as hooks or

teeth to engage with (and be wedged in) runs or holes in rails fixed to the rear wall of the unit so that the shelf cantilevers forward from said wall.

The shelf can also be fixed to the side walls of a container or may rest or slide on supporting or guiding surfaces placed on the lateral sides of the container via its plastic structure.

The shelf is usually mounted detachably and/or slidably on at least one wall of the unit or refrigerator. In one embodiment, the shelf or the assembly elements or the additional frame may also have or collaborate with anti-withdrawal safety devices intended to prevent the shelf from coming out, for example, of the rails to which it is fixed or on which it slides.

It is also possible to mount other types of assembly element or intermediate element than those previously described on the shelf according to the invention, it being possible for example for these elements to comprise plastic parts (or to consist of one or more plastics and/or metal) or parts incorporated into the plastic structure.

Other characteristics and advantages of the invention will become apparent from the description hereinafter of some nonlimiting embodiments of the invention with reference to the appended drawings in which:

- figure 1 depicts a partial schematic view in exploded perspective of a shelf according to the invention and of its assembly elements for fixing it to the rear wall of a refrigerator;
- figure 2 depicts a partial schematic view in section of the shelf before and after the shrinking of the frame;
- figure 3 depicts the shelf of figure 1 turned over

(seen schematically from beneath) in perspective;
- figure 4 depicts a partial schematic view in exploded perspective of a similar shelf this time with assembly elements and the associated runner for attaching it, in a sliding version, to the rear wall of a refrigerator.

The shelf described in figures 1 to 4 is designed in particular for supporting articles in a refrigerator and comprises a glass panel 1 (possibly with an enameled edging to conceal the join with the plastic structure, the side walls also possibly concealing this join via the shadow they cast), equipped with a structure (or surround or frame) made of polypropylene 2. This assembly is obtained as follows: polypropylene granules (preferably filled with talc to improve the mechanical strength of the polypropylene) are heated in a plasticizing chamber of an injection-molding machine to a temperature that is high enough that the plastic can be injected and the molten material is injected into the mold or injection-molding machine to obtain the semifinished product which, through the shrinkage of the plastic, will yield the structure 2. The material cools in the mold and solidifies from 160°C in the form of a semicrystalline product. When the mold is open to remove the molded frame, the plastic reaches about 70°C. The shrinkage of the plastic then begins to occur to a significant extent. In the 4 minutes (and preferably in the 1 to 2 minutes) following removal from the mold, the surface 4 of the frame on which surface the panel is to rest possibly undergoes a surface treatment (for example of the plasma type), is preferably coated with adhesive (it being possible for handling to be automated) using an elastic adhesive (a channel - not depicted - may possibly be provided to accommodate the adhesive on the surface) and the glass panel is placed on the frame (position a of the frame depicted in fine and dotted line in figure 2).

Shrinkage then continues to occur (about 75% of the shrinkage takes place in the first 15 minutes, it being possible for final shrinkage to take several hours) until the frame reaches its definitive shape (position b of the frame depicted in thick line in figure 2). In this state, the frame mates with and mechanically holds the glass on its edge 3, with a compressive force of the order, for example, of 9 MPa exerted on the edge of the glass. In a frame of the order of 420 mm wide, the final shrinkage may, for polypropylene, be as much as 4 mm. The assembly obtained is particularly robust and meets the safety standards.

The frame comprises a supporting surface 4 in the form of a frame, two lateral walls 5 with an upper part 6 forming a small rim protruding from the top face of the panel and a lower part 7 under the underside of the panel, a front extension 8 forming a handle for handling the shelf, a rear extension possibly with a channel 9 for collecting or removing liquids in the event of a spillage on the shelf, and with an upstand 10 to prevent items from coming into contact with the rear wall of the refrigerator.

The frame may also be equipped with catching (and/or retaining and/or locking) means 11 (as illustrated in figure 3) in the form of lugs, protrusions, clips, stops, etc., making it possible, for example, for assembly elements 12 (figure 1) or 12' (figure 4) to be mounted. These elements, for example metal plates obtained by stamping, have a first part (or leg) 13 equipped initially at one of its end with a hook 14 for mounting on rails provided on the rear wall of the refrigerated compartment (this hook being cut off for the sliding version depicted in figure 4), a second part 15 which is bent with respect to the first (the entity having an L-shaped cross section), the first

part being clipped onto the internal wall 16 of the lower part of a lateral wall 5 of the frame, the second part being clipped under the supporting surface 4, clipping (or fixing or imbrication) of the assembly elements with the frame being achieved using means that complement those provided on the frame (in this case in particular recesses 17), and a third part 18, 18′ which is either bent (figure 1) with respect to the second part so as to follow the contours of the supporting surface (for example covering part of its thickness 19) or fashioned so that it forms a runner (figure 4), it being possible for this bending into the chosen configuration to be done at the last minute. In the sliding version, it is also possible to provide a part 18′′ or lug butting against the thickness of the supporting surface of the frame, the fact of bordering the frame in three directions or parts making the entity more secure.

The shelf gets at least two assembly elements, each element being mounted under one of the lateral walls of the shelf, for example after storage and possible drying of the shelf obtained as described previously and depending on the desired method of attachment.

In the sliding version illustrated in figure 4, use is also made of a metal support 20 or runner, formed as a single piece for example by stamping and equipped with hooks 21 for fixing it to the rear wall of a refrigerator, and having surfaces 22 or runners intended to collaborate with the corresponding runners 18′ of the assembly elements to allow the shelf to slide. Stops 23, 24 may be provided on the assembly elements and the sliding support to arrest the movement of the shelf in mid-travel for safety reasons.

The shelf described earlier may be considered as simply

being formed of the panel and of the frame (the frame possibly being fashioned in such a way that it can be slid by its sides in the lateral runners of a refrigerator) or may be considered as being equipped with the assembly elements, or even with the previously mentioned additional frame.

The shelf according to the invention is particularly well suited to the supporting items and elements in a refrigerated compartment or a refrigerator (a refrigerator equipped with the present shelf also being something at which the invention is aimed) but may also be suitable for supporting other types of item in other types of unit.

CLAIMS

1. A shelf, particularly for a refrigerator or the like, comprising at least one panel and at least one attached plastic structure mating with and/or exerting lateral pressure on the edge of the panel.

2. The shelf, particularly as claimed in claim 1, comprising at least one panel and at least one attached plastic structure, the panel being secured to the structure by shrinking said structure.

3. The shelf, particularly as claimed in either of claims 1 and 2, comprising at least one panel and at least one plastic structure formed with at least two plastics, one of which is more flexible and intended to be in contact with the panel and at least partly covering the other which is more rigid.

4. The shelf as claimed in one of claims 1 to 3, wherein the force compressing the structure onto the edge of the glass is of the order of a few MPa.

5. The shelf as claimed in one of claims 1 to 4, and which further comprises at least one elastic adhesive and/or at least one flexible insulating gasket.

6. The shelf, particularly as claimed in one of claims 1 to 5, comprising at least one panel and at least one plastic structure, and which further comprises at least one assembly element having at least a first part clipped under the panel against a vertical wall of the plastic structure, a second part clipped under the supporting surface of the plastic structure, and a third part which is bent so that it borders another part of the shelf or fashioned to form a runner intended to collaborate with additional means for the

cantilever mounting in a unit.

7. The shelf, particularly as claimed in one of claims 1 to 6, and which slides with respect to a support formed as a single piece.

8. The shelf, particularly as claimed in one of claims 1 to 7, comprising at least one panel and at least one plastic structure obtained by air molding.

9. A method of manufacturing a shelf, particularly for a refrigerator or the like, this shelf comprising at least one panel and one plastic structure, whereby the plastic structure is formed separately from the panel by hot molding, the panel being assembled with the plastic structure as it leaves the mold before the plastic has fully shrunk.

10. The method as claimed in claim 9, wherein the panel is assembled with the plastic structure after the mold has been opened, and preferably outside the mold, before shrinkage has reached 40% of the total shrinkage.

11. The method as claimed in either of claims 9 and 10, wherein, prior to assembly, (an) elastic adhesive(s) and/or at least one flexible insulating gasket is/are deposited on at least part of the structure that is to be in contact with the panel.

12. The method as claimed in claim 11, wherein the adhesive or the gasket deposited has a conical shape and/or wherein the surface of the panel is pre-treated, prior to the application of the adhesive, for example by sandblasting, grooving, goffering, forming roughnesses or by plasma treatment so as to increase the area for contact between the plastic and the

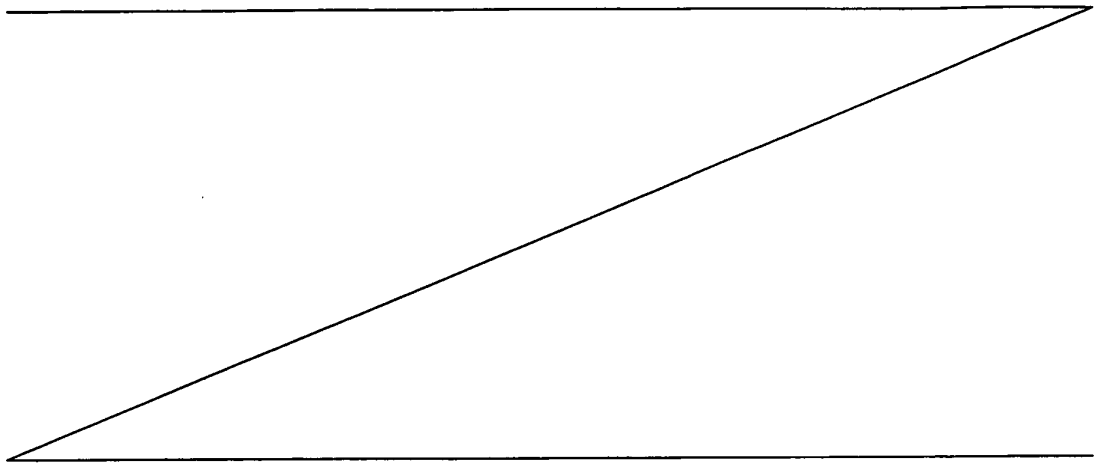
adhesive or the gasket and/or so as to create other attachment points.

13. The method of manufacturing a shelf formed of a panel and of a plastic structure, particularly as claimed in one of claims 9 to 12, wherein the plastic structure is formed by two-shot injection molding.

14. The method of manufacturing a shelf, particularly as claimed in one of claims 9 to 13, this shelf comprising at least one panel and one plastic structure, whereby the plastic structure is formed by air molding.

15. An element for assembling a shelf in a unit, this element being intended to be fixed by clipping to the shelf, and advantageously having three parts, at least two of which are intended to be fixed in two different directions and the third of which is intended to border the shelf in a third direction or is intended to form a runner.

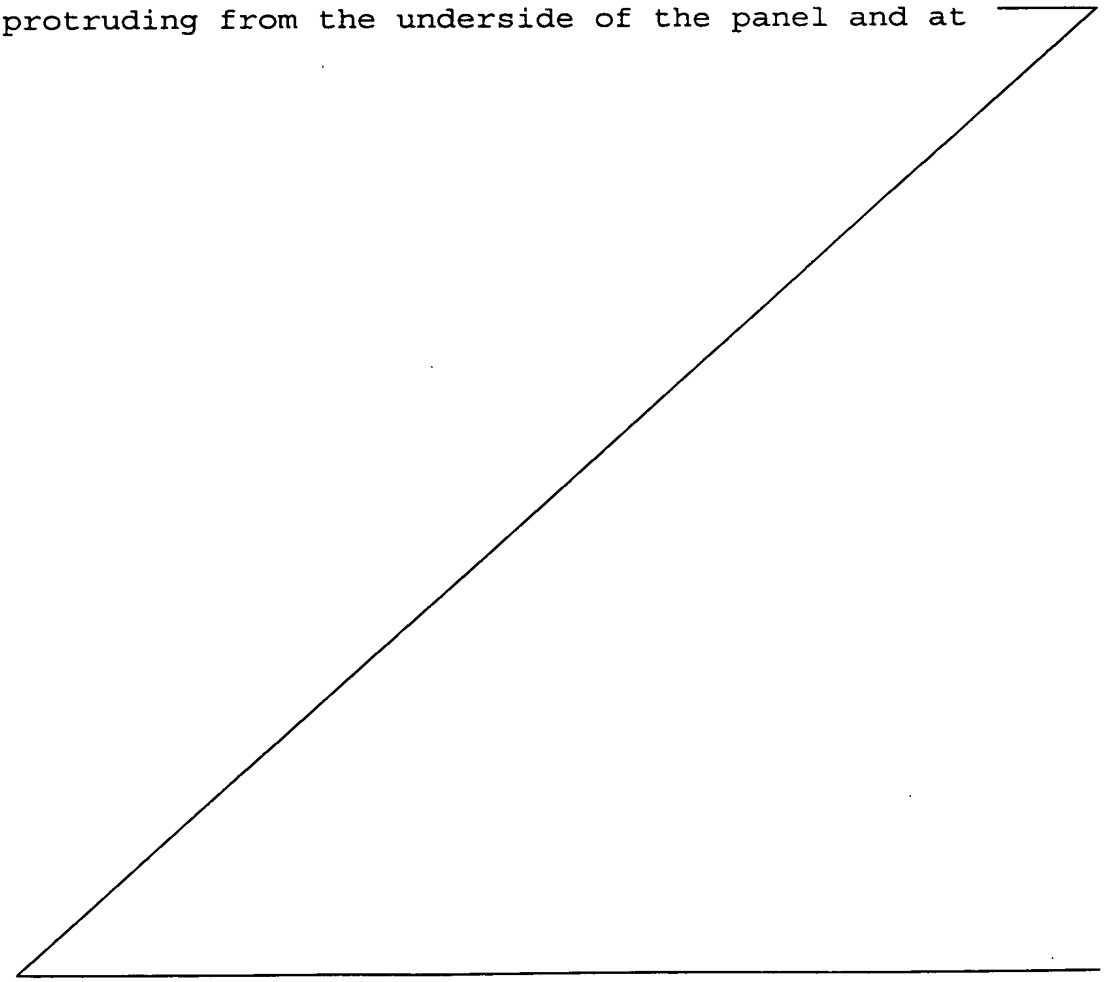
16. A refrigerator comprising at least one shelf as claimed in claims 1 to 8.



additional heat treatment of the plastic structure (reheating) subsequent to the molding of said structure, the panel being assembled with the structure after this additional heat treatment, an adhesive and/or a surface treatment possibly being deposited or performed prior to assembly.

As an alternative or in addition to the shrinkage of the plastic structure, it is also possible to produce the plastic structure by the technique of gas-assisted injection molding (or air molding) of plastic, this technique making it possible to obtain a shelf which has good robustness and rigidity with less material than conventional molding. This technique consists in introducing a pressurized inert gas (for example nitrogen) into the molten plastic during molding after the partial filling of the mold cavity so as to create, within the molded part, regions of greater thickness and empty regions. Gas-assisted injection molding of plastic makes it possible, for example, to create reinforcements (extra thicknesses, ribs, etc.) along the sides of the plastic structure and possibly lateral support arms in the very body of the plastic structure. This technique also allows more rapid cooling of the molded part and shorter production cycles, and makes it possible to obtain a particularly satisfactory surface finish.

The present invention also relates to elements for assembling (or mounting) the shelf in units, these assembly elements being fixed by clipping (or catching in particular being fixed mechanically by imbrication means such as recesses and/or protrusions, teeth, lugs) onto the plastic structure of the shelf (more precisely underneath as a general rule) and advantageously having at least three parts. These elements are initially (each) in the form of a leaf (or fin or platelet), generally made of metal, and bent (for example by stamping) so that it has an approximately L-shaped cross section with at least one leg of the L (or first part of the element) intended to be clipped, under the panel, against a vertical wall of the plastic structure protruding from the underside of the panel and at



CLAIMS

1. A shelf, particularly for a refrigerator or the like, comprising at least one panel and at least one attached plastic structure mating with and/or exerting lateral pressure on the edge of the panel.

2. The shelf as claimed in claim 1, wherein the panel is secured to the structure by shrinking said structure.

3. The shelf as claimed in either of claims 1 and 2, wherein the plastic structure is formed with at least two plastics, one of which is more flexible and intended to be in contact with the panel and at least partly covering the other which is more rigid.

4. The shelf as claimed in either of claims 1 and 2, wherein the plastic structure is obtained by gas-assisted injection molding of plastic.

5. The shelf as claimed in one of claims 1 to 4, wherein the force compressing the structure onto the edge of the glass is of the order of a few MPa.

6. The shelf as claimed in one of claims 1 to 5, and which further comprises at least one elastic adhesive and/or at least one flexible insulating gasket.

7. The shelf as claimed in one of claims 1 to 6, which additionally comprises at least one assembly element fixed by clipping to the shelf, and advantageously having three parts, at least two of which are intended to be fixed in two different directions and the third of which is intended to border the shelf in a third direction or is intended to form a runner.

8. The shelf as claimed in claim 7, wherein the assembly element has at least a first part clipped under the panel against a vertical wall of the plastic structure, a second part clipped under the supporting surface of the plastic structure, and a third part which is bent so that it borders another part of the shelf or fashioned to form a runner intended to collaborate with additional means for the cantilever mounting in a unit.

9. The shelf as claimed in one of claims 1 to 8, and which slides with respect to a support formed as a single piece.

10. A method of manufacturing a shelf as defined in one of claims 1 to 9, particularly for a refrigerator or the like, this shelf comprising at least one panel and one plastic structure, whereby the plastic structure is formed separately from the panel by hot molding, the panel being assembled with the plastic structure as it leaves the mold before the plastic has fully shrunk.

11. The method as claimed in claim 10, wherein the panel is assembled with the plastic structure after the mold has been opened, and preferably outside the mold, before shrinkage has reached 40% of the total shrinkage.

12. The method as claimed in either of claims 10 and 11, wherein prior to assembly, (an) elastic adhesive(s) and/or at least one flexible insulating gasket is/are deposited on at least part of the structure that is to be in contact with the panel.

13. The method as claimed in claim 12, wherein the

adhesive or the gasket deposited has a conical shape and/or wherein the surface of the panel is pre-treated, prior to the application of the adhesive, for example by sandblasting, grooving, goffering, forming roughnesses or by plasma treatment so as to increase the area for contact between the plastic and the adhesive or the gasket and/or so as to create other attachment points.

14. The method of manufacturing a shelf as claimed in one of claims 10 to 13, wherein the plastic structure is formed by two-shot injection molding.

15. The method of manufacturing a shelf as claimed in one of claims 10 to 13, wherein the plastic structure is formed by gas-assisted injection molding of plastic.

16. A refrigerator comprising at least one shelf as claimed in claims 1 to 9.

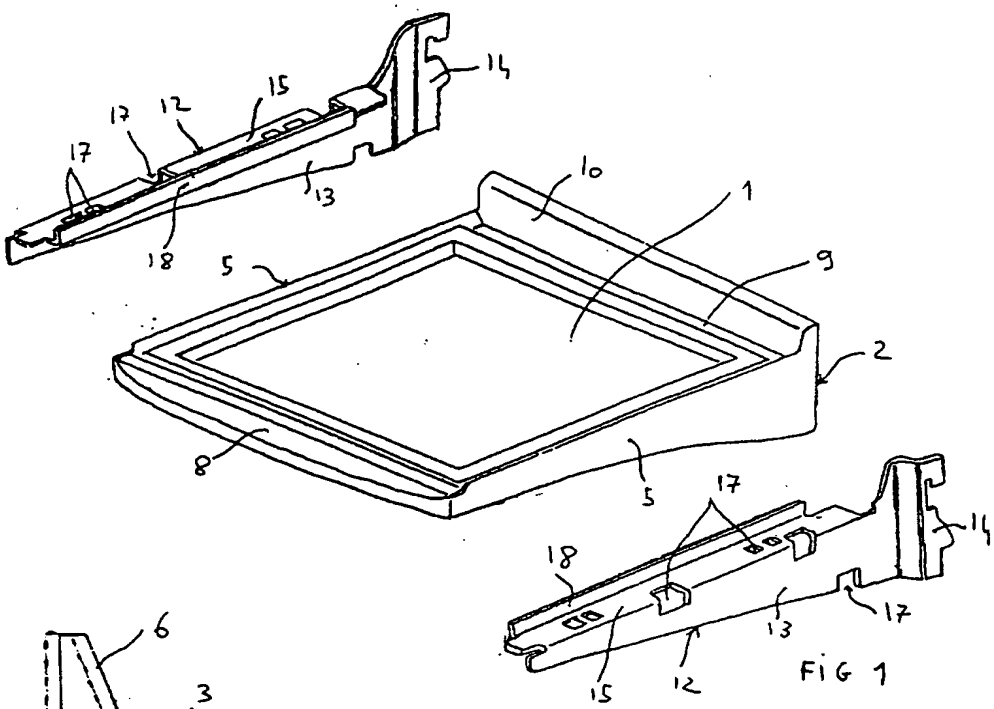


FIG 1

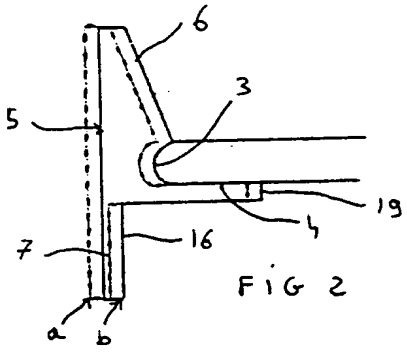


FIG 2

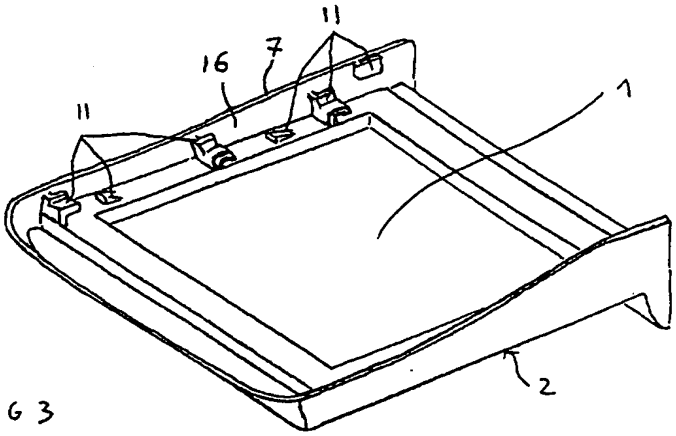


FIG 3

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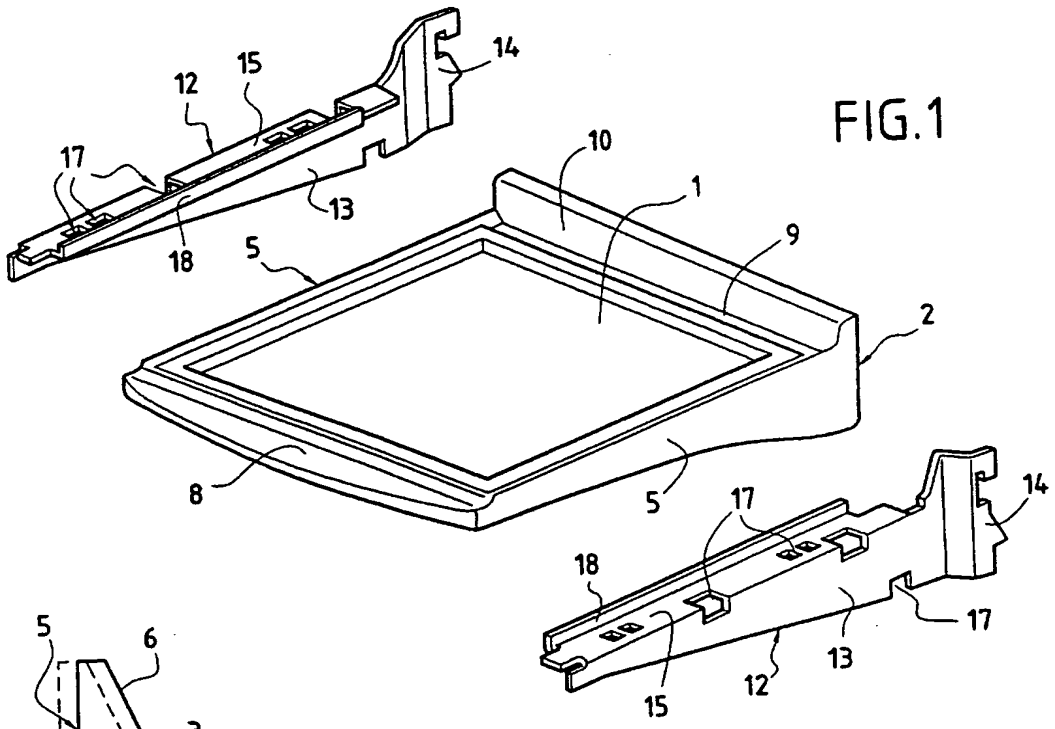

FIG.1

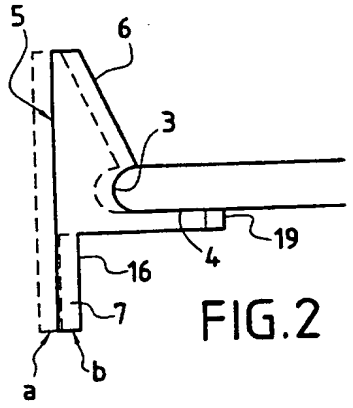

FIG.2

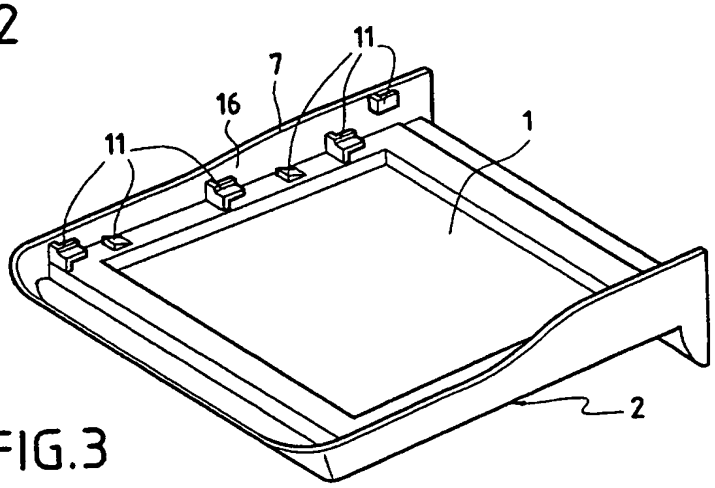

FIG.3

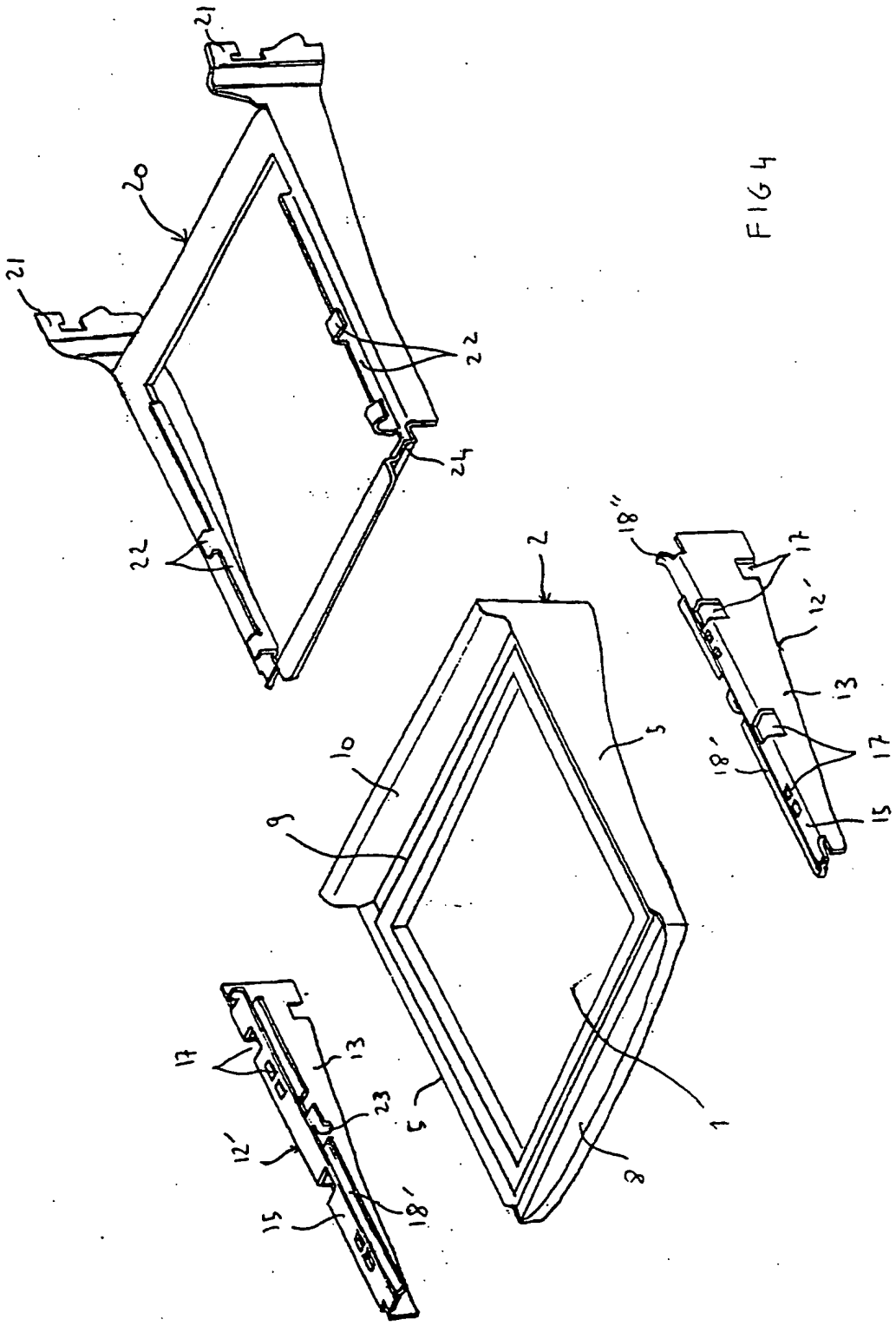

FIG 4

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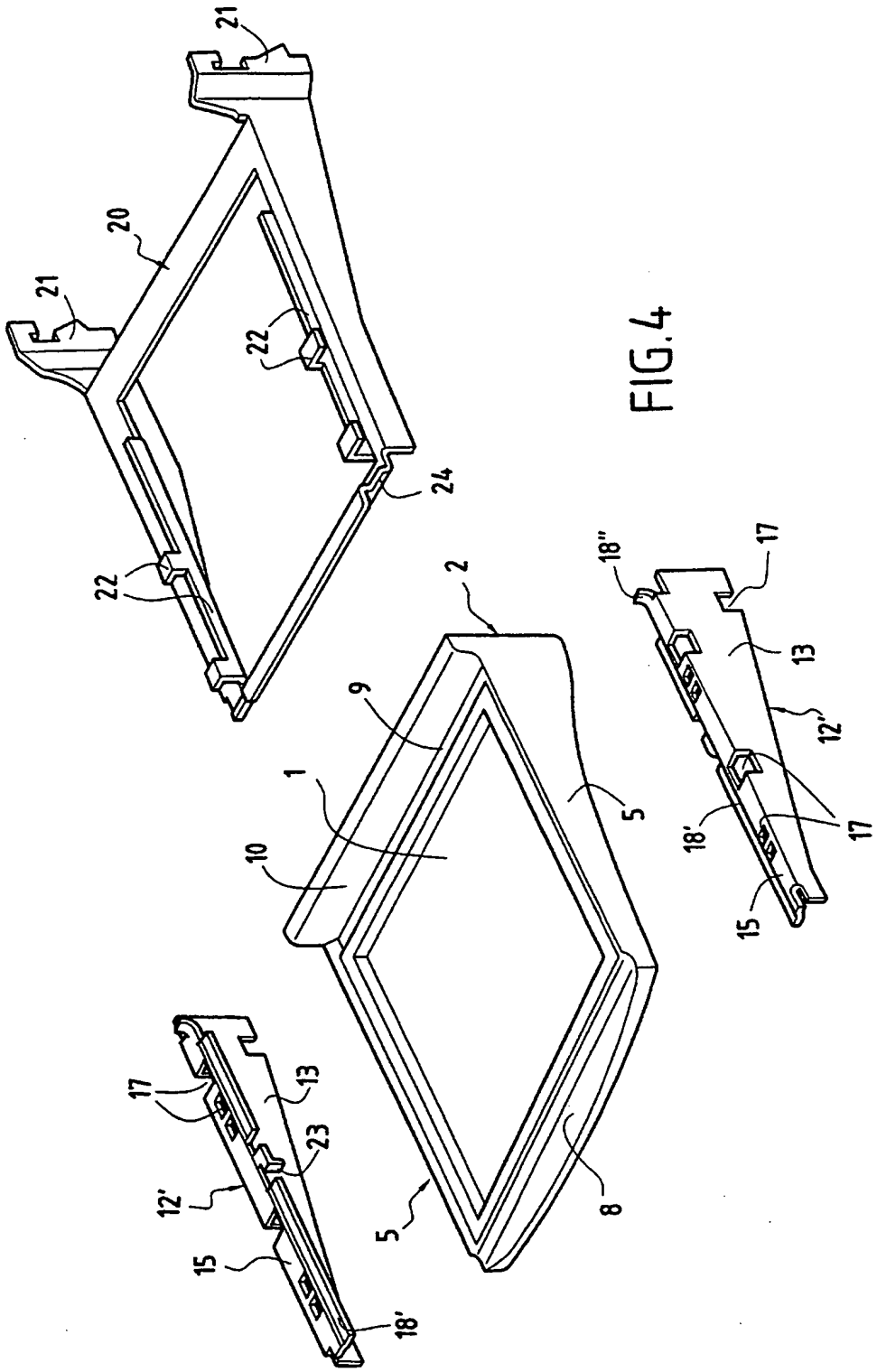

FIG.4

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UTILITY CERTIFICATE

Intellectual Property Code - Book VI

cerfa N° 11235*02

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DESIGNATION OF THE INVENTOR(S) **Page No. . 1 . / . 1**
(if the applicant is not the inventor or the sole inventor)

This form is to be filled in legibly in black ink

DB 113 W / 260899

Your file references *(optional)*	VG2 2001025 FR
NATIONAL REGISTRATION NO.	01/04,129

TITLE OF THE INVENTION (200 characters or spaces maximum)

SHELF FOR SUPPORTING ARTICLES, PARTICULARLY IN REFRIGERATED INSTALLATIONS.

THE APPLICANT(S):

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Forenames			
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Employer company *(optional)*			

DATE AND SIGNATURE(S) OF THE APPLICANT(S) OR OF THE REPRESENTATIVE (Name and capacity of the signatory)
12.04.2001
VIRGINIE GOLDENBERG
Power of Attorney No. 422-5/S.006
[signature]

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